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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/709,250

04/23/2004

Brenden M. Grove

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02/16/2006

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EXAMINER

BOMAR, THOMAS S

ART UNIT

PAPER NUMBER

3672

DATE MAILED: 02/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/709,250             | GROVE ET AL.        |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Shane Bomar            | 3672                |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 April 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 13-18, 20, 21, 24, 27-38, 42, 43, 46-51 and 53-57 is/are rejected.
- 7) ☒ Claim(s) 10-12, 19, 22, 23, 25, 26, 39-41, 44, 45, 52 and 58 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>5/3/04, 1/3/06</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Objections*

1. Claims 1, 13, 27, 46, 49, 51, 52, and 58 are objected to because of the following informalities: a) in claims 1, 27, and 46, each recitation of “a perforating gun” in the body of the claims should be --the perforating gun-- since the basis for a perforating gun is already provided in each preamble; b) in claim 13, does the recitation of “a gun” mean that there is another perforating gun?; if not, then it should most likely be changed to --the perforating gun--; c) in claim 49, the recitation of “is reduced by” should most likely be --is further reduced by-- since the pressure was already reduced in claim 47; d) in claim 51, the recitation of “includes the providing” should most likely be --includes the providing--; e) in claim 52, the word “including” should be removed; f) in claim 58, the word “in” should be removed and the claim should most likely depend from claim 52 since “the reactant” currently lacks proper antecedent basis in claim 51. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 13, 20, 46, 48, 51, and 55-57 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent 3,709,294 to Kilgore.

Regarding claim 1, Kilgore discloses an apparatus for reducing the post-detonation pressure of a perforating gun 18, the apparatus comprising: the perforating gun, as is inherently known in the art, carrying at least one explosive charge, wherein when the explosive charge is detonated the explosive charge produces a pressurized detonation gas (see Fig. 1 and col. 2, lines 18-39); and a pressure reducer 20, although any of the reducers 30, 38, 52, or 62 are said to be interchangeable depending on the application, in functional connection with the perforating gun, the pressure reducer adapted to reduce the pressure of the detonation gas (see Figs. 1-5 and at least col. 2, lines 40-62). The reducer 20 is seen to be in functional connection with the perforating gun because the reducer will not function unless the perforating gun detonates.

Regarding claims 2 and 20, the reducer is proximate the gun 18 (see Fig. 1).

Regarding claims 13, as best understood to recite “the perforating gun” instead of “a gun”, and 14-17, the reducer includes at least one of compression sections 46, 54, or 60 in functional connection with the perforating gun, wherein section 46 is a solid compressible spring, section 54 is a bellows filled with a fluid such as gas, and section 60 comprises solid rubber balls (see Figs. 3-5 and associated descriptions).

In describing the operation of the tool, Kilgore discloses the method of claim 46 of reducing the post-detonation pressure of a perforating gun comprising the steps of: providing a perforating gun 18 having explosive charges, detonating the explosive charges producing a pressurized detonation gas (see Fig. 1 and col. 2, lines 18-39); and reducing the detonation gas pressure with the aforementioned pressure reducers proximate the perforating gun to inherently encourage a surge flow from a reservoir formation, as is notoriously known in the art to occur after perforating a formation.

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Regarding claim 48, the Applicant describes the reduction of molar density as the reduction of the number of gas molecules per unit volume (see paragraph [0009]). When any of elements 32, 42, or 64 of Kilgore rise up into the respective chambers due to increased gas pressure, the number of gas molecules per unit volume on the bottom side of the elements must inherently decrease.

Regarding claims 51 and 55-57, the reducer includes at least one of compression sections 46, 54, or 60 in functional connection with the perforating gun, wherein section 46 is a solid compressible spring, section 54 is a bellows filled with a fluid such as gas, and section 60 comprises solid rubber balls (see Figs. 3-5 and associated descriptions).

4. Claims 1-4, 46, and 48 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent 5,088,557 to Ricles et al.

Regarding claim 1, Ricles et al disclose an apparatus for reducing the post-detonation pressure of a perforating gun 12, the apparatus comprising: the perforating gun carrying at least one explosive charge 36, wherein when the explosive charge is detonated the explosive charge produces a pressurized detonation gas; and a pressure reducer 56 in functional connection with the perforating gun, the pressure reducer adapted to reduce the pressure of the detonation gas (see Figs. 1-4, col. 2, lines 13-20, and col. 4, lines 38-52).

Regarding claims 2-4, the reducer is positioned in a wall of the perforating gun (see Fig. 1).

In describing the operation of the tool, Ricles et al disclose the method of claim 46 of reducing the post-detonation pressure of a perforating gun comprising the steps of: providing a perforating gun 12 having explosive charges, detonating the explosive charges producing a

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pressurized detonation gas (see col. 2, lines 13-20); and reducing the detonation gas pressure with the aforementioned pressure reducers proximate the perforating gun to inherently encourage a surge flow from a reservoir formation, as is notoriously known in the art to occur after perforating a formation.

Regarding claim 48, the Applicant describes the reduction of molar density as the reduction of the number of gas molecules per unit volume (see paragraph [0009]). When any of elements 56 of Ricles et al rupture the volume within the gun is then increased to include the annulus around the gun, therefore the number of gas molecules per unit volume must inherently decrease.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).



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7. Claims 5-9, 18, 21, 24, 27-38, 42, 43, 47, 49, 50, 53, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kilgore or Ricles et al in view of US patent 6,336,408 to Parrott et al.

Regarding claims 27, 34, 47, 49, and 50, Kilgore teaches an apparatus similar to those shown above wherein the apparatus comprises: the perforating gun, as is inherently known in the art, carrying at least one explosive charge, wherein when the explosive charge is detonated the explosive charge produces a pressurized detonation gas (see Fig. 1 and col. 2, lines 18-39); and when any of elements 32, 42, or 64 of Kilgore rise up into the respective chambers due to increased gas pressure, the number of gas molecules per unit volume on the bottom side of the elements must inherently decrease. Similarly, Ricles et al teach that the apparatus comprises: the perforating gun carrying at least one explosive charge 36, wherein when the explosive charge is detonated the explosive charge produces a pressurized detonation gas; and when any of elements 56 of Ricles et al rupture the volume within the gun is then increased to include the annulus around the gun, therefore the number of gas molecules per unit volume must inherently decrease (see Figs. 1-4, col. 2, lines 13-20, and col. 4, lines 38-52). However, neither reference explicitly teaches a temperature reducer for reducing the temperature of the detonating gas.

Parrott et al teach a perforating gun similar to that of Kilgore and Ricles et al. It is further taught that elements 30, 32, 34, 36, 41, and 71, in functional connection with the perforating gun, are heat sinks and reduce the temperature of other elements in the gun (see Figs. 1 and 3, and col. 2, lines 6-18 and lines 29-56). It would have been obvious to one of ordinary skill in the art, having the teachings of Kilgore or Ricles et al and Parrott et al before him at the time the invention was made, to modify the perforating guns taught by Kilgore or Ricles et al to include

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the heat sinks of Parrott et al, in order to obtain a perforating gun that remain at a lower temperature than the surrounding wellbore environment until the gun is ready to be fired. One would have been motivated to make such a combination since the heat-sensitive explosives of the perforating gun would be protected (see col. 1, lines 8-15 of Parrott et al). It would have been further obvious to one of ordinary skill in the art that the presence of the heat sink materials in the combination perforating gun would also reduce the temperature of the gas generated after detonation due to the very nature of the heat sink materials.

Regarding claims 5-9, 35-38, 53, and 54, the combination applied to claim 27 above can analogously be applied to these claims to show that the heat sink of the combined perforating gun has a large thermal conductivity and heat capacity, and the heat sink includes copper and water (see, for example, col. 2, lines 17-19 and col. 2, lines 51-55 of Parrott et al).

Regarding claims 18, 21, 24, and 31-33, the combination applied to claims 5 and 27 above teaches that the pressure reducer/molar density reducer is in a wall of the perforating gun (see Fig. 1 of Ricles et al).

Regarding claims 28-30, the combination applied to claim 27 above teaches that the temperature reducers are part of and in the perforating gun (see Fig. 3 of Parrott et al).

Regarding claims 42 and 43, the combination applied to claim 27 above teaches that temperature and molar density reducers include at least one of compression sections 46, 54, or 60 in functional connection with the perforating gun, wherein section 46 is a solid compressible spring, section 54 is a bellows filled with a fluid such as gas, and section 60 comprises solid rubber balls (see Figs. 3-5 of Kilgore).



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***Allowable Subject Matter***

8. Claims 10-12, 19, 22, 23, 25, 26, 39-41, 44, 45, 52, and 58 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Parrott et al teach a pressure reducer 202 in a sidewall of the gun. Barton et al, Fripp et al, Haugen et al, Johnson et al, Navarette et al, Tomek, and Wells teach perforating guns with various methods for reducing pressure and/or shock. Marion teaches that water is a heat sink for use with explosives. Leibman et al teach the concept of microencapsulated water beads, but only in conjunction with ink jets.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shane Bomar whose telephone number is 571-272-7026. The examiner can normally be reached on Monday - Thursday from 6:30am to 4:00pm. The examiner can also be reached on alternate Fridays.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bagnell can be reached on 571-272-6999. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

~~David J. Bagnell~~  
~~Supervisory Patent Examiner~~  
Art Unit 3672

tsb   
February 13, 2006

  
Jennifer H. Gay  
Primary Examiner